



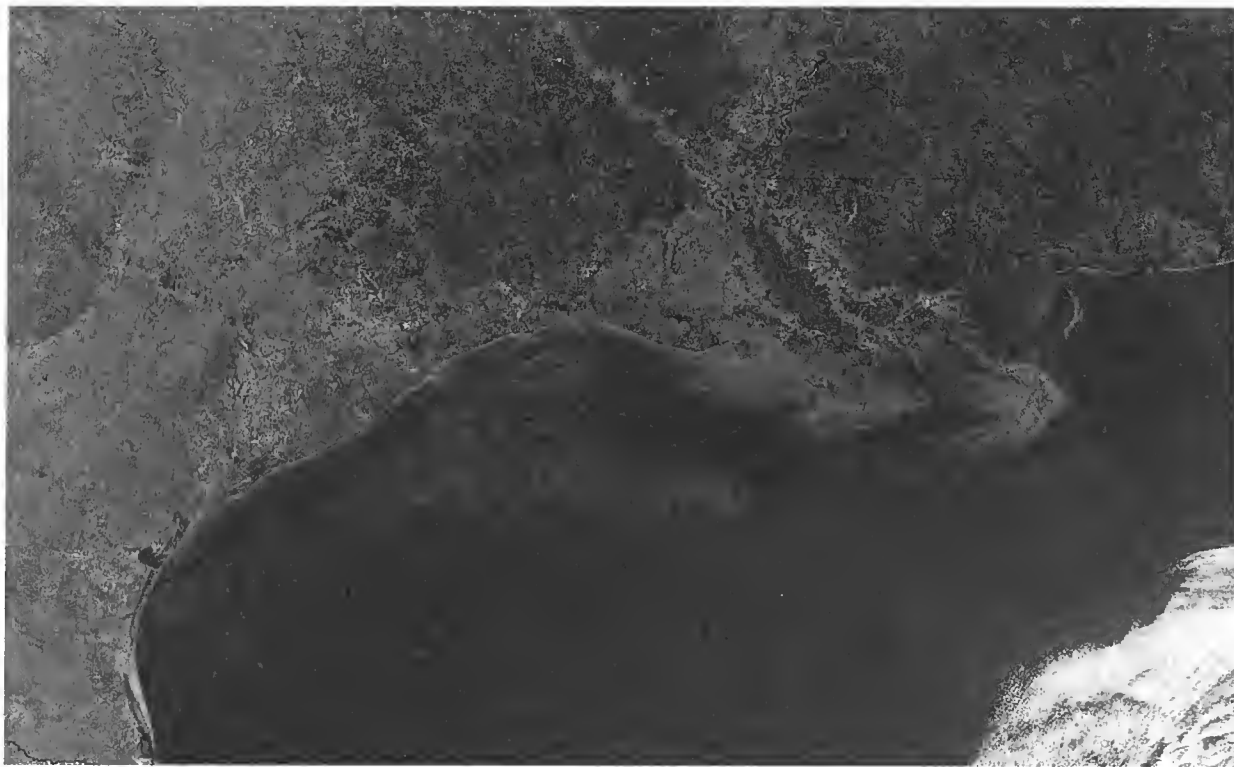
ECOFOCUS

CARY INSTITUTE OF ECOSYSTEM STUDIES

The science behind environmental solutions

Vol 3, Issue 2

Gulf of Mexico, NASA Goddard Space Flight Center



BIOGEOCHEMISTRY: CRUCIAL TO SOLVING ENVIRONMENTAL PROBLEMS

by Lori M. Quillen

The Gulf of Mexico is home to a dead zone roughly the size of New Jersey. Inhospitable waters are caused by excess nitrogen that originates from distant Midwestern agribusinesses. Fertilizer makes its way down the Mississippi River and into the Gulf, stimulating algal blooms. When algae decompose, they strip oxygen from the water, creating conditions that threaten important fisheries.

This is one example of what scientists refer to as a coupled biogeochemical cycle. In this case, human inputs to the nitrogen cycle—applying fertilizer to crops—results in a disruption to the oxygen cycle of coastal waters. Understanding how biogeochemical cycles interact is at the heart of solving many of society's most pressing environmental issues, including global climate change. The Cary Institute is playing a leadership role in advancing this emerging discipline.

At the Ecological Society of America's (ESA) annual meeting in August, Cary Institute biogeochemist Dr. Jonathan J. Cole co-organized a set of four special sessions on the topic with colleagues Dr. Adrien Finzi of Boston University and Dr. Elisabeth Holland of the National Center for Atmospheric Research. Made possible

by \$185,000 in National Science Foundation funding, the sessions convened a group of 50 speakers and invitees. In addition to Cole, Cary Institute presenters included president Dr. William H. Schlesinger, Dr. Gene E. Likens, and Dr. Amy J. Burgin.

With over 400 ESA members attending each of the sessions, the event encouraged dialogue among scientists from diverse fields. In addition to ecologists, physical scientists, atmospheric scientists, and oceanographers were well represented as both presenters and participants. Cole commented, "When people from different disciplines realize they have goals and approaches in common, it can be a catalyst for scientific progress."

Historically, scientists have focused on specific chemical cycles, such as the carbon cycle or the nitrogen cycle. But biogeochemical cycles do not exist in isolation—they are coupled to each other and to physical features of the Earth. Cole notes, "Seemingly subtle chemical changes can have large environmental effects. Consider that climate change is caused by increases in carbon dioxide and methane—gases which occupy less than 1/2 of 1% of the atmosphere."

"Seemingly subtle chemical changes can have large environmental effects."

Climate change models were identified as an area that would benefit from further coupled biogeochemical research. Most of us are aware that when burned, fossil fuels release carbon dioxide and that in the atmosphere, excess carbon dioxide drives climate change. But this is only part of the story.

During photosynthesis, plants use carbon dioxide to build new organic matter (i.e. leaves and wood). When plants grow, they can remove carbon dioxide from the atmosphere. Properly accounting for how much carbon dioxide plants will sequester in a carbon-elevated future requires insight into how plant growth is coupled to both the nitrogen and the water cycle.

In addition to strengthening climate change models, a better understanding of coupled biogeochemical cycles will help guide more effective wetland restoration, emission regulations, and fisheries management. Proceedings of the ESA session will be published in an upcoming edition of *Frontiers in Ecology and the Environment*. Conversations started at the event will help foster future collaborations.

HIGHLIGHTS

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ECOFOCUS

Ecofocus is published by the Cary Institute of Ecosystem Studies. Our scientists are leading efforts to understand human impacts on air and water quality, climate change, invasive species, and the ecological dimensions of infectious disease. As an independent, not-for-profit organization, the Cary Institute produces unbiased research that leads to more effective management and policy decisions.

PRESIDENT:

Dr. William H. Schlesinger

WRITER & EDITOR:

Ms. Lori M. Quillen

Address newsletter correspondence to:
 Communications Office
 Cary Institute of Ecosystem Studies
 Box AB
 Millbrook, NY 12545
 E-mail: QuillenL@caryinstitute.org

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FROM OUR PRESIDENT



John Halpern

Our mission of excellent science, delivered in a timely and independent fashion, has never been more appropriate for the challenges that face all of us.

Dear Friends of the Cary Institute:

With a new administration in Washington, now is a great time for environmental scientists. I can't remember when the issues facing the planet were more clear, the public mandate so strong, and the administration's desire to develop science-based policies so widespread.

Huge challenges face us in the areas of climate change, air and water pollution, mountain-top removal, and conservation biology—all subjects where Cary Institute scientists and their research can help inform policy makers.

This month, for instance, we are hosting a forum at the Cary Institute on the environmental and health effects of deicing road salts, used widely in the mid-Hudson Valley. And several of us have offered major input to the current deliberations of the U.S. Senate aiming to craft a national response to global climate change. At the local and state levels, our scientists address environmental issues whenever their expertise can be of use.

Already this year our scientists have published 118 scientific papers, and their work has been cited regularly in the media, most recently in *The New York*

Times, *US News and World Report*, and *Time Magazine*. Drs. Gene E. Likens and Richard S. Ostfeld also received prestigious awards that recognize their achievements in the field of ecology.

The continued progress by our scientists and educators, touched upon in this newsletter, hinges on the ongoing, critical support provided each year by friends and supporters like you. I invite you to take a moment to help us further our mission by making a tax deductible gift to the Cary Institute using the form on page 7. I enjoy keeping donors and friends like you informed of our successes and challenges, and inviting them to special events throughout the year. Members, in turn, can take pride in our accomplishments and in the recognition we receive.

Again, these accomplishments would not be possible without your support.

Thank you.

Dr. William H. Schlesinger, President

EDUCATION

NURTURING ECOLOGICAL UNDERSTANDING

SUMMER PROGRAMS ENGAGE DIVERSE AUDIENCES

by Lori M. Quillen

During the summer months, the Cary Institute's campus bustles with educational activity. From campers getting their first introduction to climate change while exploring our property, to undergraduates conducting research projects under the mentorship of Cary Institute scientists—our staff is committed to nurturing ecological understanding in learners of all ages.

Many of the Cary Institute's educational offerings fall under the umbrella of the organization's Ecosystem Literacy Initiative (ELI). Led by Dr. Alan R. Berkowitz, Head of Education, ELI works to connect students and teachers with current ecological information, including new research being generated by Cary Institute scientists. The initiative also strives to train the next generation of ecologists.

Berkowitz comments, "ELI is focused on bringing together scientists, educators, and learners to improve people's understanding of the world around them. Our goal is to foster citizens capable of making informed environmental choices and ecologists who are equipped to solve today's complex environmental issues."

Now in its 22nd year, the Cary Institute's Research Experiences for Undergraduates (REU) Program is a model for research training. This year 380 students applied to the 12-week summer opportunity, which is funded by the National Science Foundation. Ten students—drawn from schools across the country—were selected to hone their ecological skills while working with a Cary Institute scientist.

In addition to crafting an independent research project, REU students engage in a research community, participate in a career forum, teach high school students, and present their findings in a formal lecture. 2009 projects included studies of the viability of forest-generated biofuel; the ecological impacts of the Chinese mitten crab, a new Hudson River invader;



and connections among environmental conditions and tick-borne disease.

This summer also marked the second year of the Summer Institute for Teachers. Forty-three K-12 teachers attended the 2009 program. Team-taught by Cary Institute educators Cornelia Harris and Kim Notin, week-long summer sessions were offered for elementary and high school educators.

Using lessons focused on the Hudson River and the Cary Institute's forests and fields, participating teachers interacted with our scientists and learned how to integrate ecosystem concepts into their classrooms. Ecosystem literacy learning progressions were explored, with emphasis on the carbon cycle and links to climate change, the water cycle, and the importance of biodiversity.

Four teachers were also given the opportunity to participate in the Tidal Marsh Project, organized by Cary Institute freshwater ecologist Dr. Stuart E. G. Findlay. This entailed conducting field research on the Hudson River and using knowledge gained from the experience to inform a classroom lesson.

A high school educator learning about Hudson River ecology during our Summer Institute for teachers.

Now in its 16th year, the Cary Institute's Ecology Camp continues to engage students in grades 2 through 7 in ecological exploration. This summer, seven weeklong sessions were held. Under the direction of trained environmental educators, 75 campers learned about climate change while performing experiments, investigating our campus, and interacting with staff scientists.

The Cary Institute is proud to serve as an educational resource for undergraduates, teachers, and school children. Knowledge gained while teaching these diverse groups has enriched our understanding of how people learn about ecosystems. This, in turn, has helped our programs evolve, so that they are built on not only the best ecological science, but the most effective teaching and mentorship models.

The Summer Institute for Teachers and Ecology Camp will be offered again in 2010; the REU program will begin accepting applications in October. Learn more at www.caryinstitute.org.

SPOTLIGHTS

OSTFELD TO RECEIVE MERRIAM AWARD



John Halpern

R-L: Rick Ostfeld discusses a Lyme disease research project that received stimulus funding with Congressman Scott Murphy.

Cary Institute animal ecologist Dr. Richard S. Ostfeld was recently selected to receive the 2009 C. Hart Merriam Award, an honor conferred by the American Society of Mammalogists. Established in 1974, the award recognizes outstanding research contributions to the discipline of mammalogy. Nominees are established scientists who are actively engaged in research and who have made significant contributions to the science of mammalogy.

Ostfeld was selected for the distinction based on peer nomination, a strong research record, and letters of support submitted by colleagues. The selection committee was particularly impressed with the originality of Ostfeld's research on the ecology of infectious disease, and the impact that it is having on our understanding of the role that mammalian communities play in disease transmission.

In keeping with Merriam Award tradition, Ostfeld will be presenting his research at the plenary session of the 2010 American Society of Mammalogists meeting, to be held in Laramie, Wyoming, next summer.

LIKENS ELECTED EINSTEIN PROFESSOR BY CHINESE ACADEMY OF SCIENCES

The Chinese Academy of Sciences has elected Dr. Gene E. Likens as an Einstein Professor. A pioneering ecologist renowned for having co-discovered acid rain, Likens is the Founding Director and President Emeritus of the Cary Institute of Ecosystem Studies. He was awarded the professorship based on the strength of his academic and intellectual merits.

Each year, the Chinese Academy of Sciences awards Einstein Professorships to 15-20 international scientists actively working at the frontiers of science and technology. Awardees conduct lecture tours in China, with the goal of strengthening bilateral and international collaboration. Travel and accommodation expenses are covered by the Academy.

Likens will be departing for China in late October. His itinerary will include giving a plenary lecture at the Symposium of the International Society of Limnology (to be held in Nanjing), visiting the Three Gorges Dam and Yangtze River, receiving an honorary degree from Jinan University, and lecturing at the Nanjing Institute of Geography and Limnology, Jinan University, and the South China Botanical Garden.



Jonathan Walsh

Dr. Gene E. Likens

SMITH APPOINTED TO SRA DISTINGUISHED FACULTY

On the basis of her accomplishments in grants administration, the Society of Research Administrators International (SRA) has appointed Marie Smith to a three-year term as a member of the Society's Distinguished Faculty. Smith joins a team of 45 SRA International members who have demonstrated exceptional theoretical and practical knowledge in the field of research administration.

Smith's appointment entails sharing her expertise with SRA audiences. During her term, she may be called upon to act as an expert speaker or consultant, to serve as a faculty member in educational courses, and/or to conduct reviews of research administration capacity within organizations.

In her role as a Certified Research Administrator at the Cary Institute, Smith is responsible for overseeing the organization's Grants and Compliance Office. This includes tracking proposals, managing compliance, and assisting scientific staff in their pursuit of competitive grant funding.



John Halpern

Marie Smith, CRA

REACHING OUT

SCIENCE AND MANAGEMENT FORUM

ROAD SALT: IMPACTS TO THE ENVIRONMENT AND HUMAN HEALTH

To promote safe winter driving conditions, deicers are applied to roadways throughout the Northeast. The most commonly used deicer is sodium chloride, otherwise known as road salt. In New York State alone, state and local governments apply 500,000 tons annually. This inexpensive deicer comes with hidden costs to both the environment and human health.

On Friday, October 16th from 9 a.m. to noon, the Cary Institute and Cornell Cooperative Extension of Dutchess County will be hosting a management-based forum about the impact that road salt has on natural areas, drinking water supplies, and health conditions. Participants will have the opportunity to weigh in on a discussion about how municipalities can improve future policy decisions.

Speakers will include Dr. William H. Schlesinger, President, Cary Institute; Dr. Stuart E. G. Findlay, Aquatic Ecologist, Cary Institute; Marie Brule, Dutchess County Department of Health; Dr. Paul Feldman, Vassar Medical Center; Charles E. Morris, Margaret Chase Smith Policy Center, University of Maine; and Theron Tompkins, Clinton Town Superintendent of Highways.

Free and open to the public, the event will be held in the Cary Institute's auditorium, located at 2801 Sharon Turnpike (Rte. 44) in Millbrook, New York. Reservations are appreciated, but not required. To RSVP, please contact Claudia Rosen at (845) 677-7600 x171 or rosenc@caryinstitute.org.



Robert Nyström, Big Stock Images

OUR GROUNDS

NEW CAMPUS SIGNS
ORIENT AND EDUCATE

The Cary Institute's grounds are open through the end of October. Come explore parts of our 2,000-acre research campus. During your visit, consult the Cary Institute's kiosks for trail maps and interpretive information, including a new guide to 101 common birds that can be found in our fields, forests, and wetlands.

It's a wonderful time to view the changing foliage. Hickory trees are turning bright yellow, and the rich reds of the oaks contrast beautifully with adjacent little bluestem meadows. While taking in the colors of fall, visitors will notice some updates to our grounds.

At the head of Wappinger Creek Trail, a new interpretive sign has been installed. Visible from the main visitor kiosk, the visually-rich sign, based on four paintings by artist Ján C. Porinchak, depicts forest succession. It is the first in a series of educational signs being set up along our trail system. Their goal—to teach visitors about key ecological concepts. Throughout the campus, new orientation signs have also been erected. They feature our updated logo, brighter colors, and an easy-to-read format.

Planning a visit? Our trails and roadways are open to the public from dawn to dusk through October 31st. Internal roadway gates open at 8:30 a.m.; gates are locked at 7 p.m.



Pamela Freeman

Ecologist Dr. Emma Rosi-Marshall (center) and her family visit the new succession trail sign.

SUPPORTERS CORNER

VAN MELLE KAMP
APPOINTED DIRECTOR
OF DEVELOPMENT

Olivia van Melle Kamp

John Halpern

The Cary Institute is pleased to announce the appointment of Olivia van Melle Kamp as Director of Development. Van Melle Kamp will be leading the Cary Institute's efforts to cultivate support from a wide range of sources, including individual donors, foundations, and corporations. She is also helping the organization establish a major annual fundraising event.

Van Melle Kamp brings more than thirty-five years of expertise in marketing, fundraising, and strategic planning to the Cary Institute. During her recent tenure at the Wildlife Conservation Society, she helped secure funding for global conservation initiatives.

A founding board member of the Dutchess Land Conservancy, van Melle Kamp is personally committed to understanding and protecting the environment. She will become a familiar face at public events and Aldo Leopold Society happenings. Please join us in welcoming her into the Cary Institute community.



"Watery Passage/Fern Glen" 2009, acrylic on canvas, by Rebecca Allan

CELEBRATING THE HUDSON AND ITS
WATERSHED

On September 25th, in celebration of the Hudson River's Quadricentennial, the Cary Institute held a special evening of Science and Art. The well-attended event featured a lecture on Hudson River change by freshwater ecologist Dr. David L. Strayer, followed by a reception for landscape painter Rebecca Allan, who is also the Head of Education at the Bard Graduate Center in New York City.

Drawing on more than 20 years of Cary Institute river research, including the expertise of his colleagues, Strayer's lecture explored the question, "Would Henry Hudson recognize the river that he sailed up 400 years ago?" The answer is yes, but he would find it profoundly changed. Interested in learning more? A four-part essay on the topic, authored by Strayer for the *Poughkeepsie Journal*, is available on our website.

Following a panel discussion on river science, Allan spoke about her current exhibition, *Tributary*. Encompassing large canvases as well as works on paper, the paintings represent wetland habitats, including the Wappinger Creek—a tributary of the Hudson River that runs through the Cary Institute's campus. *Tributary* will be on display in our auditorium through January 17th, 2010; viewing hours are Monday through Friday from 8:30 a.m. to 4:30 p.m.

Interested in meeting the artist? On Sunday, October 25th from 2 p.m. to 4 p.m., Allan will present an artist's talk followed by a short walk to the Fern Glen, a site of inspiration for one of the central paintings in the exhibition. To RSVP, please contact Pamela Freeman at (845) 677-7600 x121 or e-mail freemanp@caryinstitute.org.

Artwork in the exhibition is available for purchase; a percentage of the proceeds will help support the Cary Institute.

CALENDAR

Upcoming Public Programs

The events below will be held in our auditorium, located at 2801 Sharon Tpk. (Rte. 44) in Millbrook, NY. For more information, visit us online or call (845) 677-7600 x121.

Friday, October 23rd at 7 p.m.

The City, the Country, and the Changing Environment

Explore how history can help inform Hudson Valley landscape management. Vassar Professor Dr. Harvey Flad and award-winning author Leila Philip will discuss their recently published books *Main Street to Mainframes: Landscape and Social Change in Poughkeepsie* and *A Family Place: A Hudson Valley Farm, Three Centuries, Five Wars, One Family*.

Friday, November 6th at 7 p.m.

The American Landscape at the Tipping Point

Take a visual journey with author, pilot, and photographer Alex S. MacLean. Using dramatic aerial photographs, his book, *OVER: The American Landscape at the Tipping Point*, catalogs our culture's excessive use of energy and natural resources, highlighting the need for sustainable solutions.

Scientific Seminar Series

Free and open to the public, our Scientific Seminars are held on Thursdays at 11 a.m. in the Cary Institute's auditorium. A sampling of offerings is below; a complete list is available online at www.caryinstitute.org.

October 15: Determinants of Structure in a Desert Shrub Community, Dr. Bruce Mahall, University of California, Santa Barbara

October 22: Impacts of a Forest Invader on Nitrogen Cycling: A Story from the Understory, Dr. Jennifer Fraterrigo, University of Illinois

October 29: Autotrophic Respiration in a Changing Arctic Climate: Mechanistic Responses and Ecosystem Consequences, Dr. Kevin Griffin, Lamont-Doherty Earth Observatory

November 5: I Got to See the Growth!: Temporal and Spatial Dimensions of Urban Youths' Engagement with Nature and Science, Dr. Jrene Rahm, University of Montreal

November 12: Plumbing the Global Carbon Cycle: Integrating Inland Waters into Harvard Forest Carbon Dynamics, Dr. William Sobczak, College of The Holy Cross

November 19: The Role of Plant-soil Feedbacks on Species Potential to Expand Their Distributional Ranges in Response to Climate Change, Dr. Inéz Ibáñez, University of Michigan

December 3: Environmental Change, Pathogen Pollution, and the Timely Birth of Conservation Medicine, Dr. Katherine Smith, Brown University

December 10: Cross-habitat Linkages Fuel Food Webs and Ecosystem Respiration in Lakes, Dr. Chris Solomon, University of Wisconsin Center for Limnology



Ways to Support the Cary Institute

The Cary Institute offers two membership levels. **General members** receive an *Ecofocus* subscription and e-mail notification when we hold open lectures and events. **Aldo Leopold Society Members** are a special part of the Cary Institute family. Exclusive privileges include access to invitation-only lectures, receptions, and science updates.

General Membership

- \$50 Individual
 \$60 Family
 \$100 Sponsor
 \$250 Club/School

Aldo Leopold Society Membership

For those who want to invest in understanding the natural world.

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Cary Institute
of Ecosystem Studies

Cary Institute Main Campus
Box AB (2801 Sharon Turnpike)
Millbrook, NY 12545
Tel: (845) 677-5343 • Fax: (845) 677-5976

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EDUCATION IN ACTION SCENES FROM THE SUMMER



Daisy Dominguez, Lisa Gizzarelli

L-R: Cara Krieg, a biology major from Grinnell College, spent the summer researching songbird communication. Walter Gadsby, a 6th grader, investigated insect diversity during Ecology Camp. Learn more about Cary education on page 3.